



Health Services
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November 14, 2008

TO: Each Supervisor

FROM: John F. Schunhoff, Ph.D. 
Interim Director

SUBJECT: **FACILITIES DEVELOPMENT, INC. ANALYSIS
ON EMERGENCY DEPARTMENT BOARDING TIME
AND SURGE CAPACITY AT LAC+USC MEDICAL
CENTER, HARBOR-UCLA MEDICAL CENTER, AND
OLIVE VIEW-UCLA MEDICAL CENTER**

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www.dhs.lacounty.gov

*To improve health
through leadership,
service and education.*

On April 22, 2008, your Board instructed the Department of Health Services (DHS) to work with the Chief Executive Office (CEO) and Facilities Development, Inc. (FDI) to conduct a study and present findings on how a patient surge of 5 percent, 10 percent, 15 percent, and 20 percent could affect the Emergency Department Boarding Time (EDBT) of the LAC+USC replacement facility when the hospital operates at 80 percent, 85 percent, 90 percent, and 95 percent occupancy, and provide an assessment on the regional impact of such surge.

On July 3, 2008, DHS provided the Board with a simulation analysis prepared by FDI on the LAC+USC EDBT and surge capacity at the replacement facility. This analysis was also presented at the July 8, 2008, Board meeting.

Please find attached a similar analysis conducted by FDI that examines the regional impact of a surge of 5 percent, 10 percent, 15 percent, and 20 percent on the EDBT at LAC+USC, Harbor-UCLA, and Olive View-UCLA Medical Centers when the hospitals operate at 80 percent, 85 percent, 90 percent, and 95 percent occupancy.

DHS staff is available to brief your offices on the attached analysis. If you have any questions please let me know or your staff may contact Cheri Todoroff at (213)240-8272.

JFS:ct

Attachment

c: Chief Executive Officer
County Counsel
Executive Officer, Board of Supervisors



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COUNTY OF LOS ANGELES – DEPARTMENT OF HEALTH SERVICES

EMERGENCY DEPARTMENT BOARDING TIME AND SURGE CAPACITY ANALYSIS

LAC+USC MEDICAL CENTER, HARBOR-UCLA MEDICAL CENTER, AND OLIVE VIEW/UCLA MEDICAL CENTER

Background

On April 22, 2008, the Los Angeles County Board of Supervisors ("Board") instructed the Department of Health Services (DHS) to work with the Chief Executive Office and Facilities Development, Inc. (FDI) to conduct a study and present findings on how a patient surge of 5 percent, 10 percent, 15 percent, and 20 percent could affect the Emergency Department Boarding Time of the LAC+USC replacement facility when the hospital operates at 80 percent, 85 percent, 90 percent, and 95 percent occupancy, and provide an assessment on the regional impact of such surge.

On July 3, 2008, DHS provided the Board with a simulation analysis prepared by FDI on the LAC+USC emergency department boarding time and surge capacity at the replacement facility. This analysis was also presented at the July 8, 2008, Board meeting.

The following is a similar analysis conducted by FDI that examined the regional impact of a surge of 5 percent, 10 percent, 15 percent, and 20 percent on the Emergency Department Boarding Time at LAC+USC, Harbor-UCLA, and Olive View/UCLA Medical Centers when the hospitals operate at 80 percent, 85 percent, 90 percent, and 95 percent occupancy.

Data and Assumptions

The model uses actual data from each facility including arrival data and activity duration data (i.e., time from arrival to ED bed; time from ED bed to inpatient bed, discharge, or transfer; etc.). Data for LAC+USC and Olive View is for the period June 1, 2007 to May 31, 2008. Data for Harbor is from January 1, 2008 to May 31, 2008.

The modeling assumptions used by FDI to conduct the analysis include the following:

- Analysis focused on the main emergency department (ED) of each facility. Patients who were routed directly to the pediatrics ED, triaged to urgent care, etc., were not included in the model.

- The type of patient surge that was used in the model is one that reflects an increase in patient visits to the main ED applied evenly over time. This analysis does not consider a surge related to a large scale incident or natural disaster.
- Patients were assumed to leave without being seen if not placed in a main ED bed or treatment area within 24 hours of arrival.
- Per DHS Emergency Medical Services (EMS) policy (Policy 709), facilities can be on diversion (not receiving additional 911 transports to the ED when the ED is full) for 45 minutes and then will go off diversion for 15 minutes before evaluating the need to go back on diversion again.

Analysis Results

In summary, the analysis shows that most indicators (percentage of time a facility is on diversion, length of stay for patients in the ED, percentage of patients who leave without being seen, etc.) are impacted when there is a patient surge and the indicators worsen as the surge increases from 5% to 10%, 15%, and 20%.

However, the negative trend of the indicators becomes less severe as the inpatient occupancy increases from 80% to 85%, 90%, and 95%. Inpatient occupancy is the percentage of available inpatient beds that are used for patients. As the percentage of available beds that are actually used for patients increases, the impact of a patient surge is less severe.

- EMS Diversion – County policy allows a hospital to be on diversion and not receive 911 transports for 45 out of every 60 minutes when the hospital declares their facility is at capacity. A hospital that is on diversion for 45 minutes must reopen for 15 minutes before evaluating whether to go back on diversion status. As a result, a hospital cannot be on diversion status more than 75% of the time. When operating at 80% inpatient occupancy, all three facilities will be on diversion status a majority of the time with Harbor and Olive View potentially needing to be on diversion more than 75% of the time at the higher surge levels which would be inconsistent with County policy. At 90% and 95% inpatient occupancy the facilities begin to have some capacity at the lower surge levels, particularly LAC+USC and Olive View. At 95% inpatient occupancy, all facilities are anticipated to be on diversion for less than 75% of the time at all surge levels.
- Leave Without Being Seen (LWBS) – Most patients that leave without being seen do so because the main ED is full and they would wait over 24 hours for a main ED/treatment area bed. The LWBS rate is high at all inpatient occupancy levels and all surge levels until 95% inpatient occupancy is achieved. At 95% inpatient occupancy the LWBS rate

increases from 2% with no patient surge to 9% with a 20% patient surge at Olive View, from 7% to 17% at LAC+USC, and from 9% to 22% at Harbor.

- Emergency Department Boarding Time (EDBT) – EDBT is the time from when the physician writes the order to admit to the time when the patient is placed in an inpatient bed. The median EDBT is over 12 hours at all facilities at all surge levels at 80% inpatient occupancy and over 7 hours at 85% inpatient occupancy. At 95% inpatient occupancy EDBT is below 7 hours at all surge levels.
- Main ED Length of Stay (LOS) – ED LOS is the time from patient arrival in the ED until disposition (admission, discharge, or transfer). At 80% inpatient occupancy the main ED LOS is over 12 hours in all three facilities at all surge levels. At 95% inpatient occupancy, the main ED LOS ranges from 5 hours with a 5% patient surge to 8 hours with a 20% patient surge at Olive View, from a little over 8 hours to nearly 11 hours at LAC+USC, and from 11.5 hours to 12.5 hours at Harbor. The main ED LOS for patients who are admitted is over 20 hours at all three facilities when inpatient occupancy is at 80%. At 95% inpatient occupancy, the main ED LOS for admitted patients improves to under 6 hours at Olive View with a 5% surge, under 12 hours at LAC+USC, and a little over 14 hours at Harbor.
- Emergency Department Utilization – The main ED is completely full with close to 100% utilization of ED treatment areas at all surge levels when inpatient occupancy is at 80%. The situation improves at 95% inpatient occupancy, however ED utilization continues to be high with 73% of treatment areas being utilized with a 5% surge at Olive View, 92% at LAC+USC, and 98% at Harbor.

Summary

- In general, all indicators are impacted when there is a patient surge and worsen as the surge increases from 5% to 20%. This includes the amount of time that the facilities are on diversion, percentage of patients who leave without being seen, number of hours that patients remain in the ED after a physician writes an order to admit them to an inpatient bed, and total number of hours that patients spend in the ED from time of arrival to discharge, admission, or transfer.
- DHS hospitals should operate at an inpatient occupancy of 95%. While the emergency departments are heavily impacted in all scenarios, they are able to operate most effectively when the greatest percentage of available inpatient beds are being used for patients.

**LAC USC, Harbor, Olive View
Main ED Boarding Time and Surge Capacity
Analysis**

**Summary Report
September 2008**



Objective

The objectives of the project are to:

- Estimate, at a regional level, for LAC+USC Medical Center, Harbor-UCLA Medical Center and Olive View-UCLA Medical Center Emergency Departments, the surge impact to Emergency Department Boarding Time (Main EDBT) at volume increases of 5%, 10%, 15% and 20% while operating at 80%, 85%, 90% and 95% inpatient occupancy.

Executive Summary

- Expect 5% increase in patient arrivals in new EDs
- Keep inpatient occupancy at 95%
- Inpatient occupancy below 90% will cause Main ED boarding time to exceed 7 hours

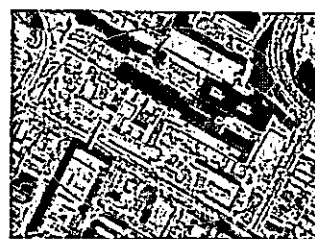
Harbor



Olive View



LAC+USC



Glossary

Patient Surge	Increase in patient visits to the Main ED applied evenly over time (analysis does not consider a surge related to a large scale incident or disaster).
Boarding Time	The time from when the physician <u>writes</u> the order to admit until the patient is <u>placed</u> in an inpatient bed.
IP Occupancy	Percentage of available adult inpatient beds used for adult patients.
Other IP Admits	Inpatient admits which come from other sources besides the Main ED, such as Transfers, Direct Admits, etc.
LWBS	Leave Without Being Seen; patients who leave before placement in a Main ED bed or before medical screening evaluation, usually due to long wait times.
Median	The middle value when the set of measurements are arranged from lowest to highest.
ED LOS	ED Length of Stay; the time from patient arrival until disposition for admission, discharge or transfer.

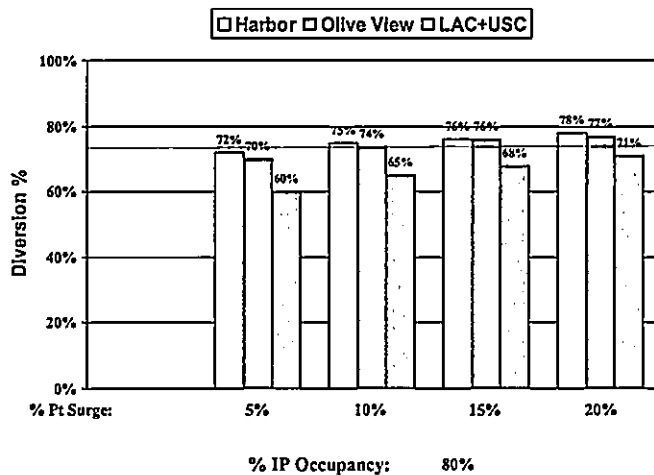
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Modeling Assumptions

- Actual Arrival Data
- Patients placed according to priority
- Activity durations based on historical data and validated by estimates from Subject Matter Experts
- Analysis focused on Main ED (Some patients routed directly to areas such as pediatrics ED, urgent care, etc. Varies by facility.)
- 95% inpatient occupancy is attainable and typical of current operations
- Surge in patient volume applied evenly over timeframe with no process changes
- Patients leave without being seen if not placed in a Main ED bed (Model assumes patients LWBS if not placed in an ED bed within 24 hours of arrival.)
- Diversion will last forty-five minutes, go off diversion for 15 minutes before evaluating going back on diversion again

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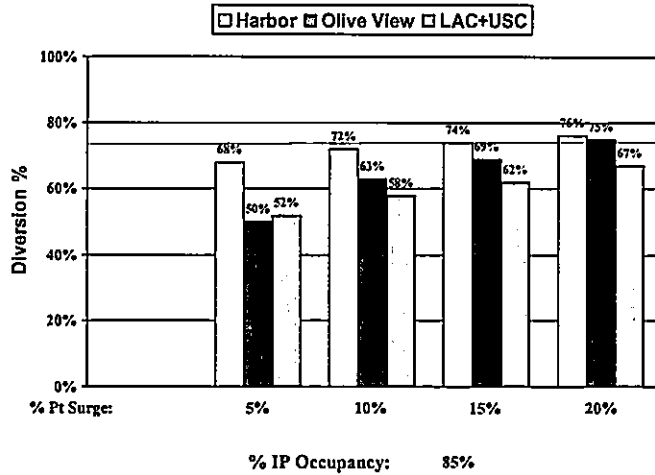
EMS Diversion 80% Occupancy



☐ The simulation shows the Main ED will stay full almost all the time until IP occupancy reaches at least 95%
☐ Diversion cannot exceed 75% per County policy

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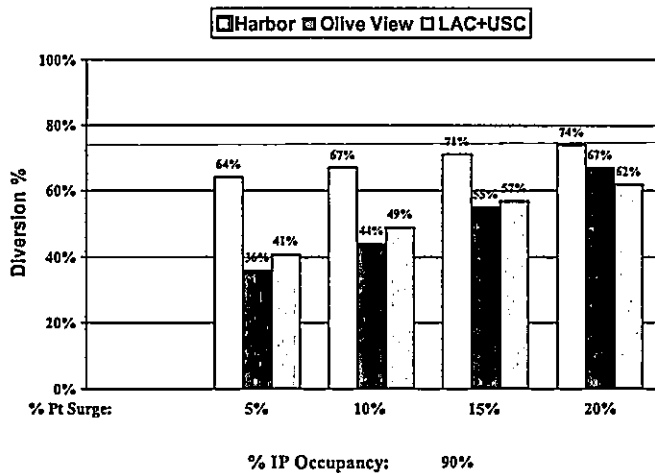
EMS Diversion 85% Occupancy



□ The simulation shows the Main ED will stay full almost all the time until IP occupancy reaches at least 95%
 □ Diversion cannot exceed 75% per County policy

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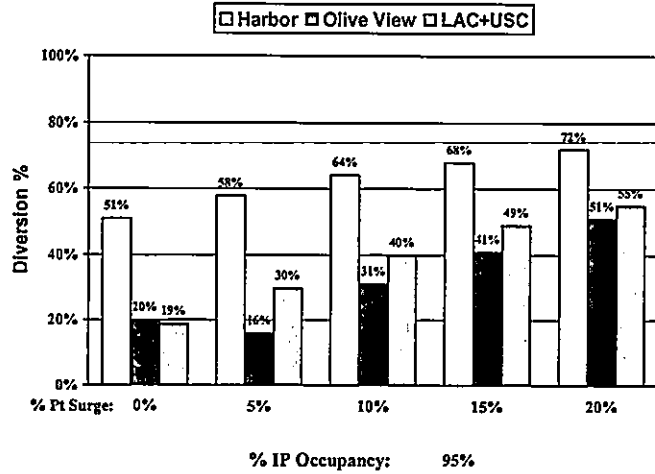
EMS Diversion 90% Occupancy



□ The simulation shows the Main ED will begin to show some capacity for Olive View and LAC+USC
 □ Diversion cannot exceed 75% per County policy

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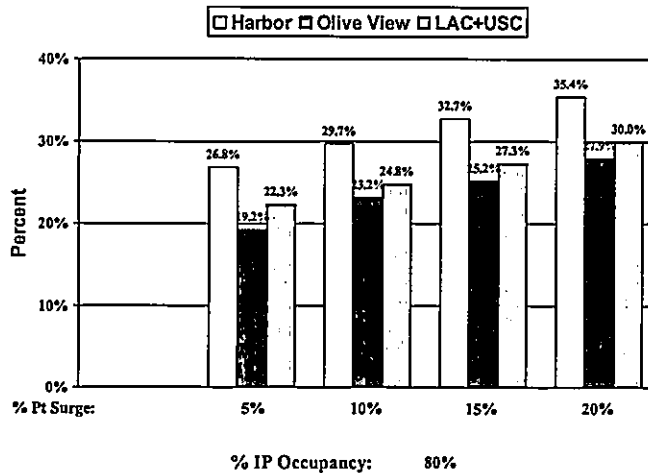
EMS Diversion 95% Occupancy



□ The simulation shows the Main ED will have available capacity when IP occupancy reaches at least 95%
 □ Diversion cannot exceed 75% per County policy

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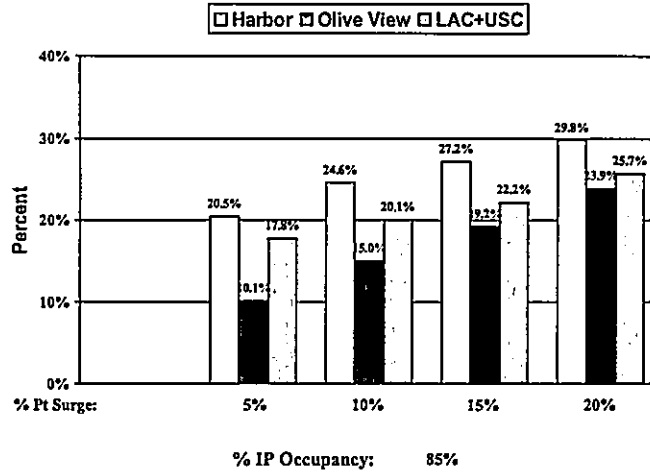
Leave Without Being Seen (LWBS) 80% Occupancy



□ Most of the patients that leave without being seen do so because the Main ED is full and they would wait over 24 hours for a Main ED bed.

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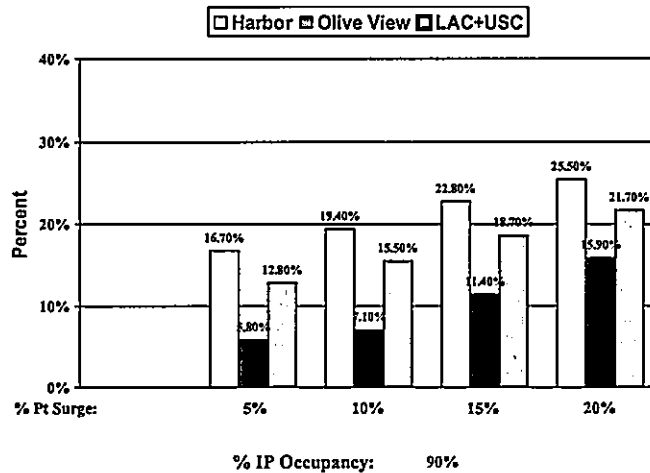
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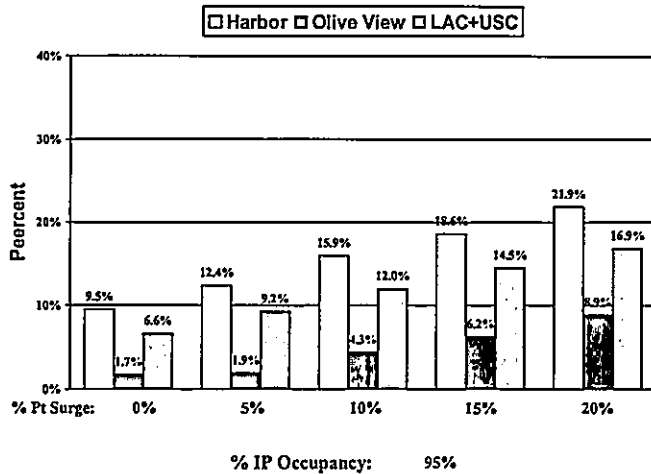
Leave Without Being Seen (LWBS) 90% Occupancy



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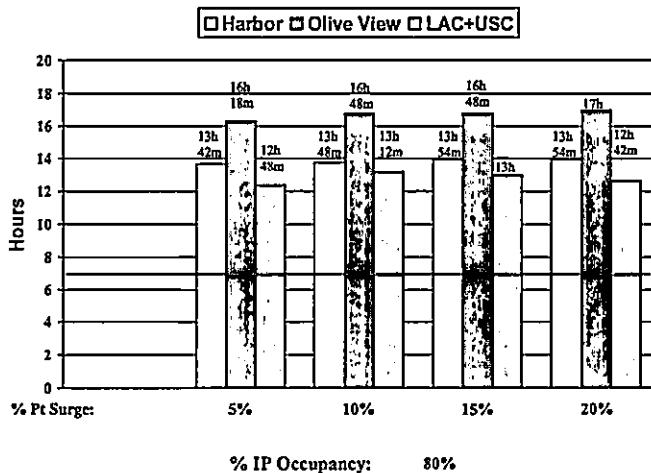
Leave Without Being Seen (LWBS) 95% Occupancy



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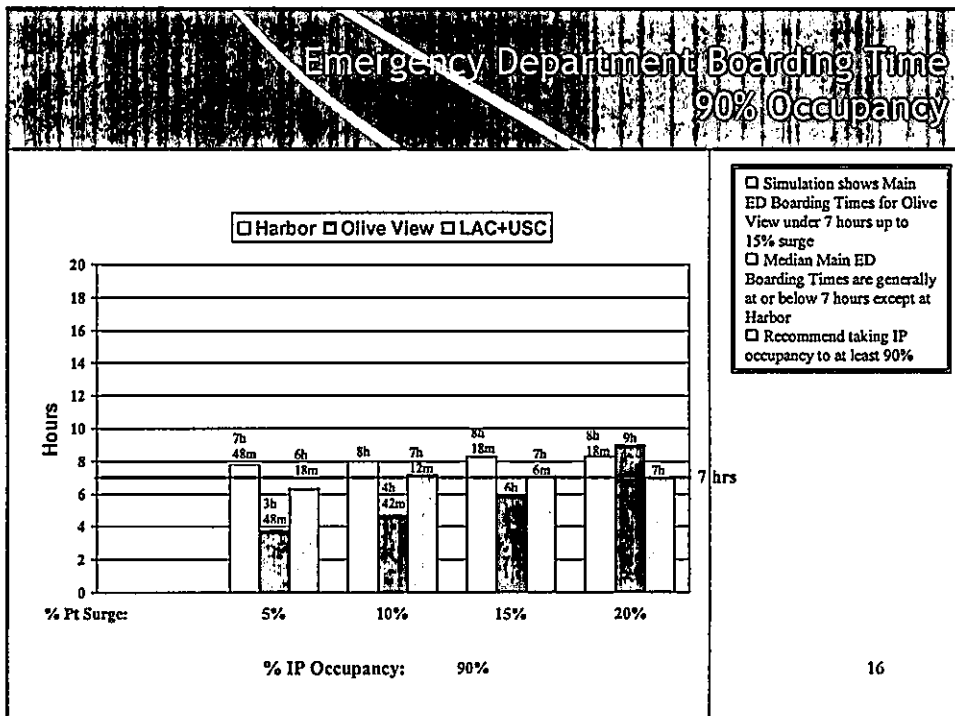
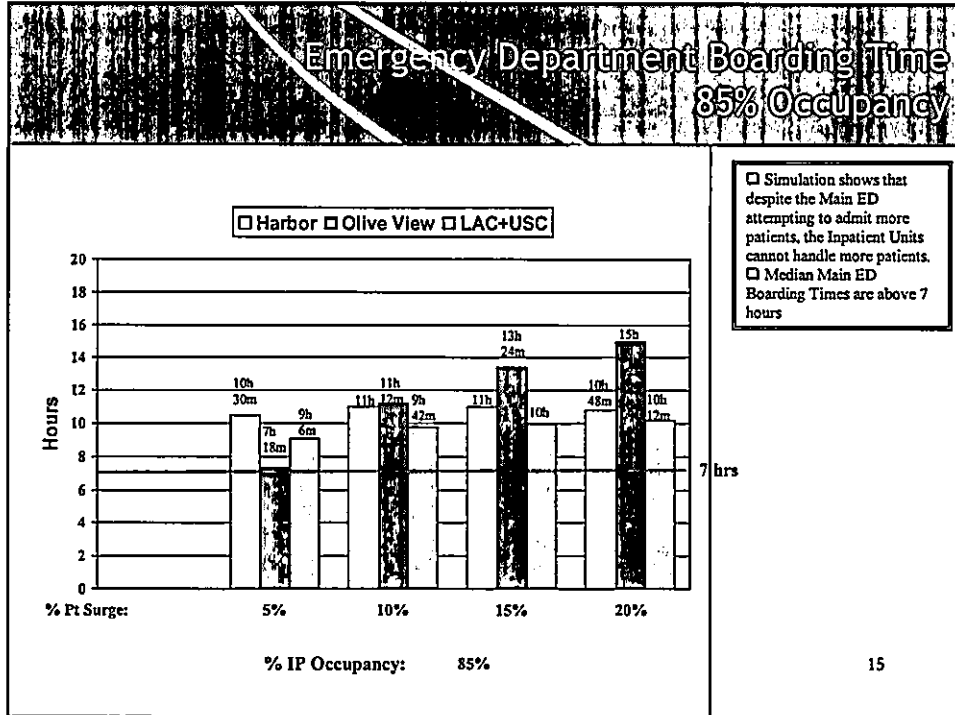
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Emergency Department Boarding Time 80% Occupancy

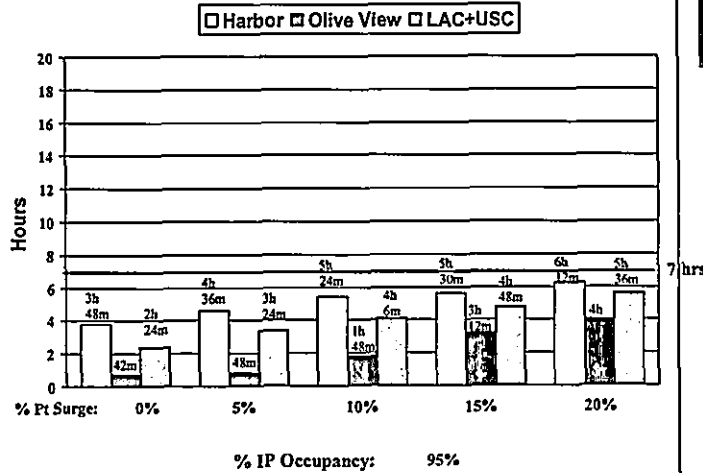


Simulation shows that despite the Main ED attempting to admit more patients, the Inpatient Units cannot handle more patients
 Median Main ED Boarding Times are above 7 hours
 7 hour threshold used as comparison for all three facilities
 LAC+USC required to meet 7 hour threshold according to Harris-Rodde settlement

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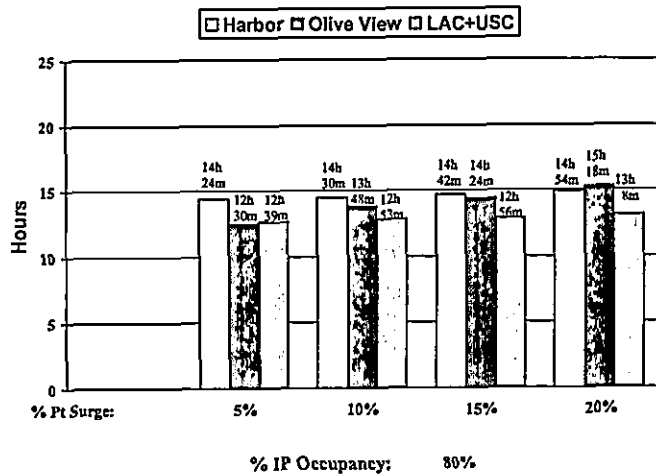
Emergency Department Boarding Time 95% Occupancy



□ Median Main ED Boarding Times are below 7 hours for all three facilities
□ Recommend keeping IP occupancy at 95%

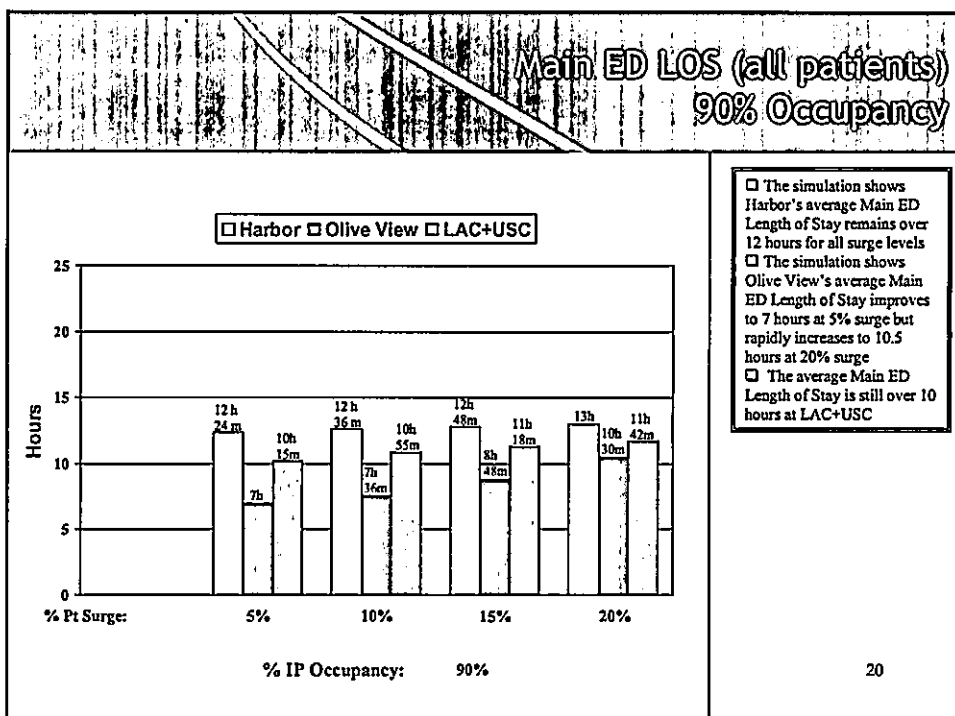
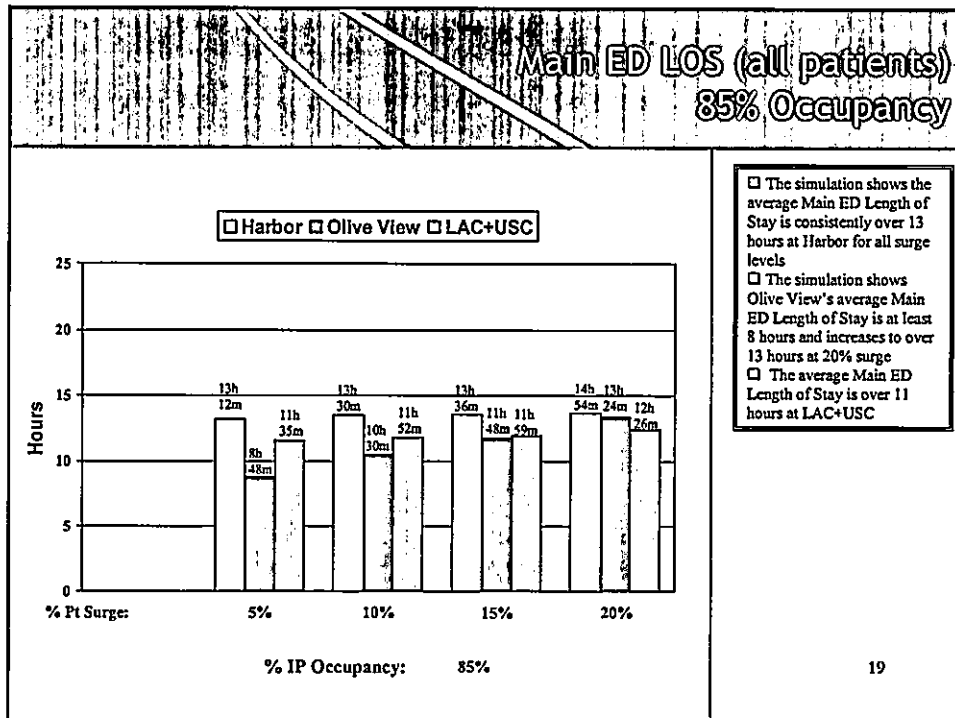
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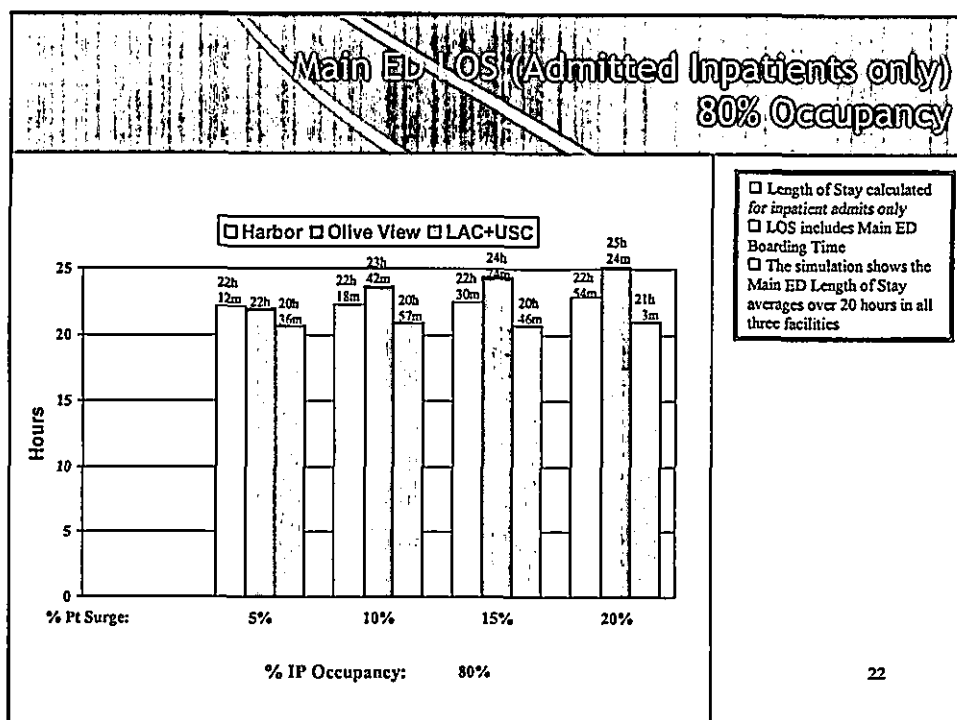
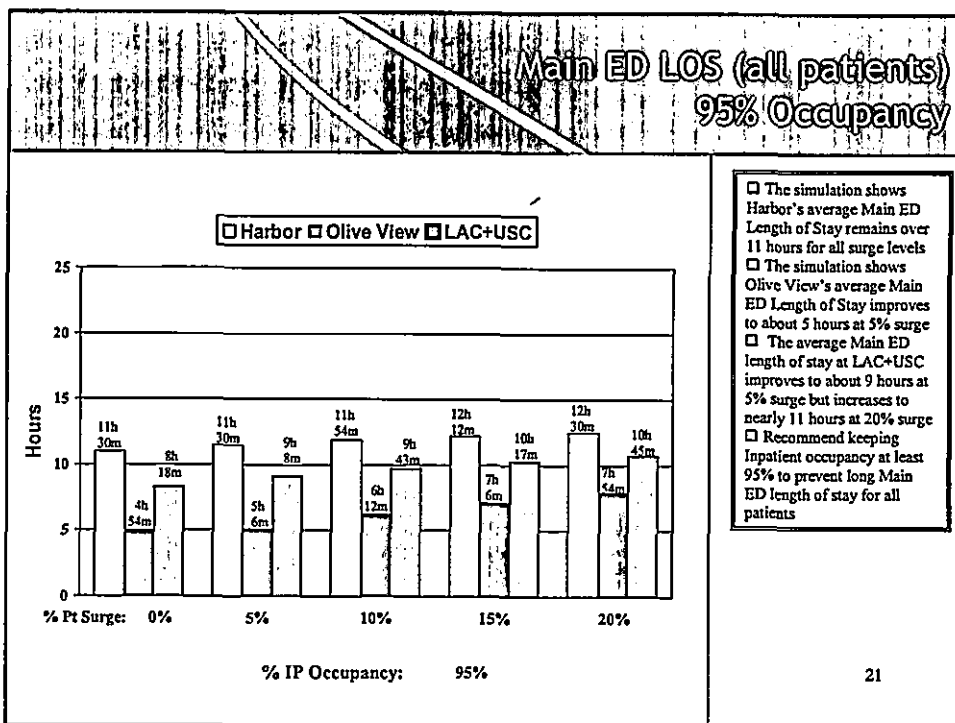
Main ED LOS (all patients) 80% Occupancy



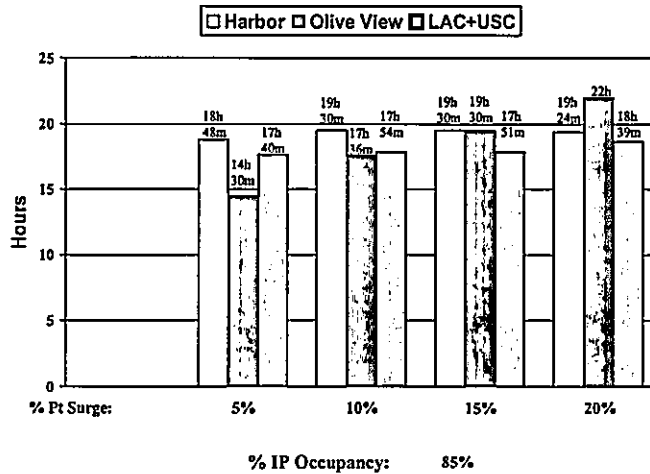
□ Length of Stay for all includes discharged patients and inpatient admits
□ LOS includes Main ED Boarding Time for inpatient admits
□ The simulation shows the Main ED Length of Stay averages over 12 hours in all three facilities

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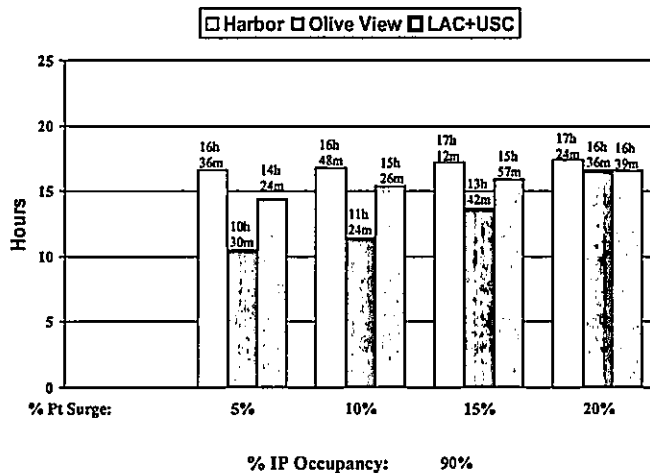
Main ED LOS (Admitted Inpatients only) 85% Occupancy



- The simulation shows the average Main ED Length of Stay is consistently around 19 hours at Harbor for all surge levels
- The simulation shows Olive View's average Main ED Length of Stay is at least 14 hours and increases to about 22 hours at 20% surge
- The average Main ED Length of Stay is over 17 hours at LAC+USC

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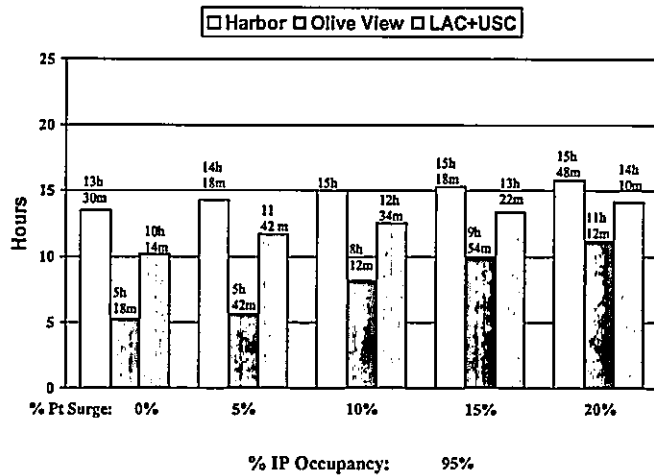
Main ED LOS (Admitted Inpatients only) 90% Occupancy



- The simulation shows Harbor's average Main ED Length of Stay remains over 16 hours for all surge levels
- The simulation shows Olive View's average Main ED Length of Stay improves to 10.5 hours at 5% surge but rapidly increases to over 16 hours at 20% surge
- The average Main ED Length of Stay is still over 14 hours at LAC+USC

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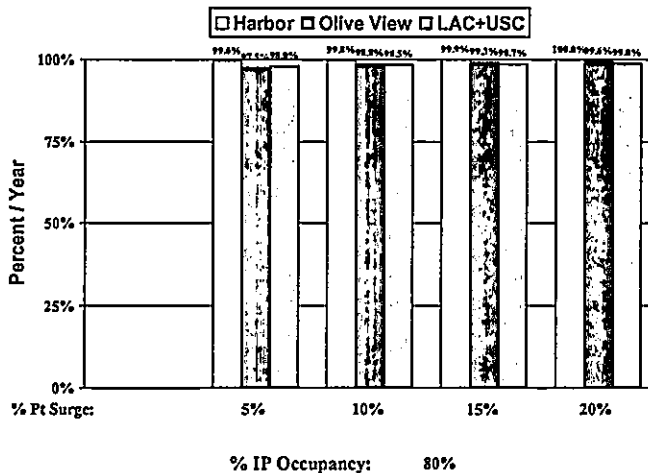
Main ED LOS (Admitted Inpatients only) 95% Occupancy



- The simulation shows Harbor's average Main ED Length of Stay remains over 13 hours for all surge levels
- The simulation shows Olive View's average Main ED Length of Stay improves to about 6 hours at 5% surge
- The average Main ED length of stay at LAC+USC improves to about 12 hours at 5% surge but increases to over 14 hours at 20% surge
- Recommend keeping inpatient occupancy at least 95% to prevent long Main ED length of stay for inpatient admits

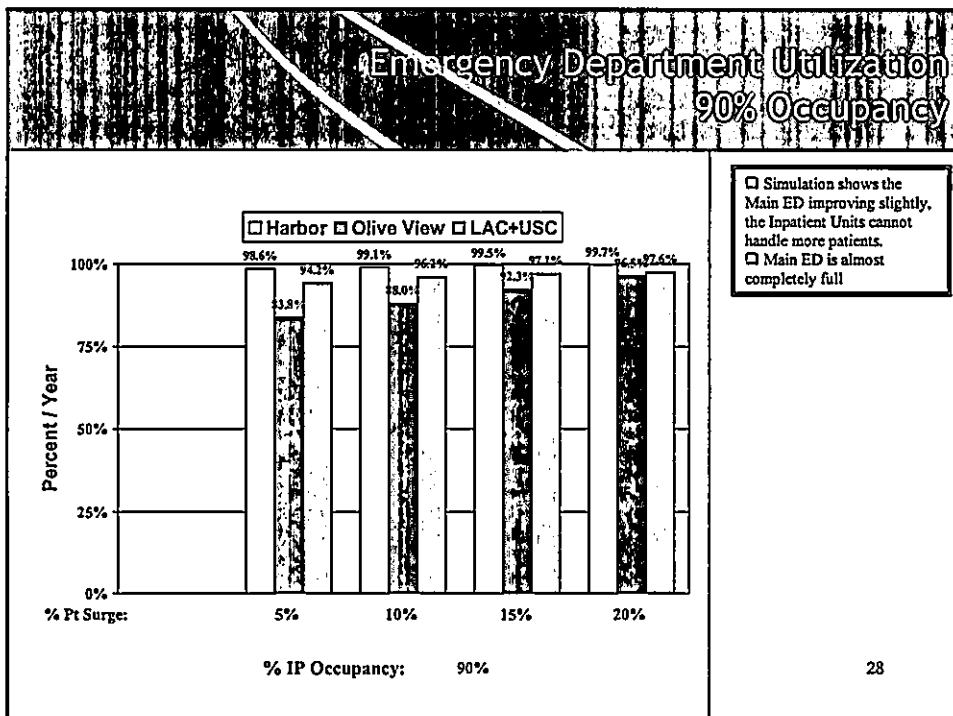
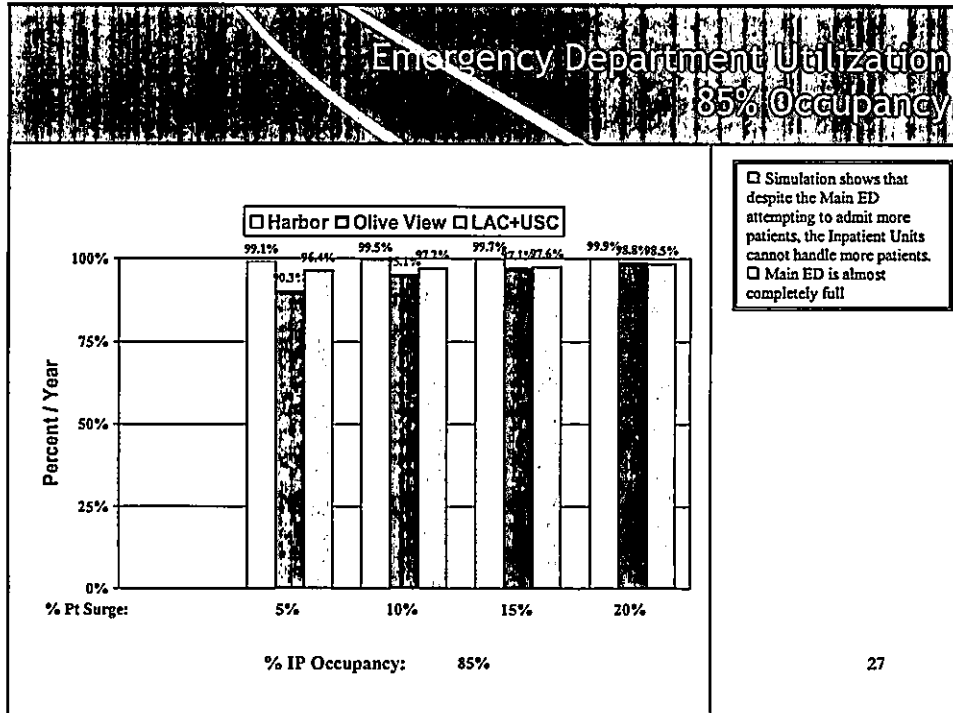
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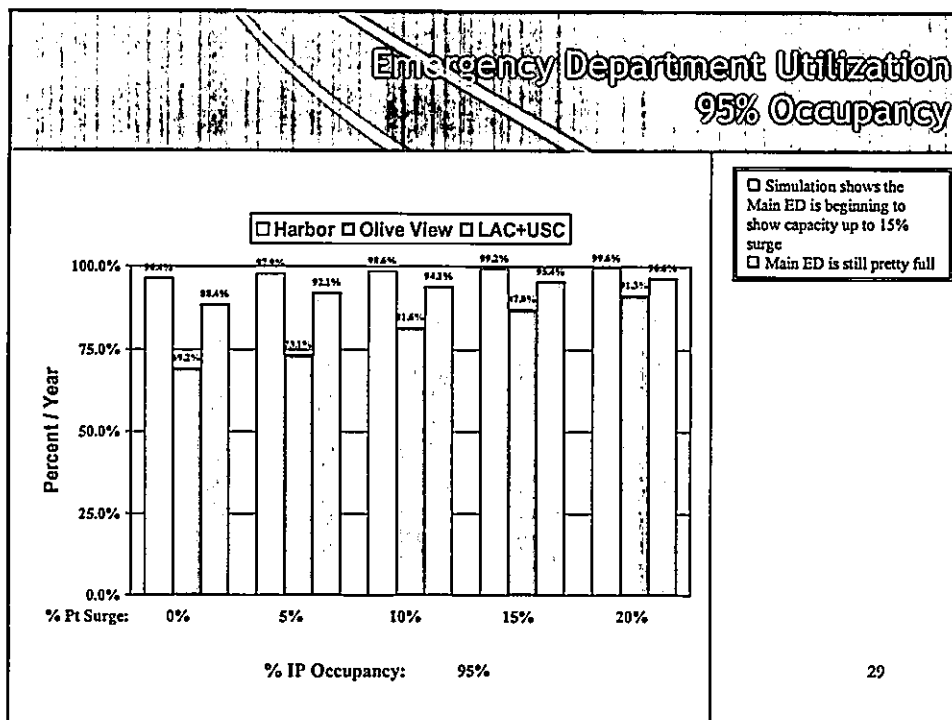
Emergency Department Utilization 80% Occupancy



- Simulation shows that despite the Main ED attempting to admit more patients, the Inpatient Units cannot handle more patients.
- Main ED is completely full

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